RX-337

Rec'd

ERITEL AB

Person in charge, Telephone	Date	Our reference
Göran Carlsson, +46 31 105935	August 17, 1990	ET/VD/2370/90
	Your communication of	Your reference

Chairman of Mobitex Operators Association
Jan-Olof Runnås
Televerket Radio
136 80 RANINGE

AUG 27 1990

To the members of
the MOA Technical Guidance Council

Televerket Radio, SWEDEN
Telecom Finland, FINLAND
Norwegian Telecom, NORWAY
Cantel Inc, CANADA
RAM Mobile Data Inc, USA
RAM Mobile Data Ltd, UK

Dear Sirs

First, I would like to thank the members of the MOA technical group for their contributions to the specification for the battery-saving protocol for handportable terminals.

As agreed at the MOA meeting in Toronto and at the meeting at our office in Gothenburg we hereby send you the first official issue of the battery-saving protocol for portable terminals. It is distributed to Televerket Radio (SWEDEN), Telecom Finland (FINLAND), Norwegian Telecom (NORWAY), Cantel Inc (CANADA) and RAM Mobile Data Inc (USA).

Below are some aspects on the specification.

TERMINAL TYPE , TTI

The Specification for the battery-saving protocol is considered as an addendum to the 8kb terminal specification, meaning that terminals must conform to the Mobitex Terminal Specification 8kb, Terminal Type 3, RIA as well as to the battery-saving protocol.

Terminals that follows the battery-saving protocol have the Terminal Type 4 (TTI = 4).

DOCUMENT HANDLING

The network operator may chose if the battery-saving protocol should be included in the binder for Terminal Type 3 or put together in a new binder for Terminal Type 4. We enclose a caption list and a document list for a Terminal Type 4 binder.

ENCLOSED DOCUMENTS

1. *CAPTION LIST 001 53-03/LZBA 703 1001 1990-08-17 A*

2. *LIST OF DOCUMENTS 00151-03/LZBA 703 1001/05 1990-08-17 A CANTEL*

3. *LIST OF DOCUMENTS 00151-03/LZBA 703 1001/06 1990-08-17 A RMD*

4. *ADDENDUM 1056-A296 6084 1990-08-13 A (BATTERY-SAVING PROTOCOL FOR PORTABLE TERMINALS)*

We are looking forward to a continuous co-operation with NOA and remain

Yours truly

Åke Johansson
President
ERITEL AB

ERITEL AB
RUBRIKFÖRTECKNING
CAPTION LIST

Dokumentnummer · Document number 001 53 - 03/LZBA 703 1001	
Godkänd · Approved EE/SYSC STT STT Datum · Date / Rev 1990-08-17 A	
Fära · Banér MOBITEX TERMINAL SPECIFICATION	
Upplaga 0	

Dokumentnamn / LIST OF DOCUMENTS		Blad / Sheet 1(2)
Uppgjord - Prepared ET/SYS MÖt	Fakmansvarig - Subject responsible ET/SYS MÖt	Nr No 001 51 - 03/LZBA 703 1001/05 Ue
Delges-Godkänd - Examined/approved ET/SYSC STP		Datum - Date / Rev 1990-08-17 A	Fil - File MTS01D.5
Beskrivning		Title MOBITEX TERMINAL SPECIFICATION Fixed and mobile terminal with addendum for portable terminal

This set of documents, entitled "MOBITEX TERMINAL SPECIFICATION" applies to:

MOBITEX system:	Cantel Inc, Canada Fixed and mobile terminal with addendum for portable terminal
Terminal type:	4 900 MHz/8 kbps
Binder identification:	LZBA 703 1001/05, R1A

COMMON SECTIONS:

Section	Document number	Rev
Caption List	001 53 - 03/LZBA 703 1001 Ue	A
Section 1:		
Arrangement of documents	1551 - LZBA 703 1001 Ue	E
List of documents	This document	
Section 2:		
System description MOBITEX	1551 - A 296 5073 Ue	J
Section 3:		
General description terminals	1056 - A 296 5170 Ue	B
Section 4:		
Terminology	0033 - LZBA 703 1001 Ue	E
Section 5:		
References	0015 - LZBA 703 1001 Ue	E
Section 6:		
Network operator documents		
Section 8:		
Application layers	2/1056 - A 296 5171 Ue	G
Section 9:		
Network layer	5/1056 - A 296 5171/2 Ue	A
Appendix A, Packet formats	51/1056 - A 296 5171/2 Ue	A
Appendix B, Dialogues	52/1056 - A 296 5171/2 Ue	A
Appendix C, Logical description	53/1056 - A 296 5171/2 Ue	A

Bildkort

Nr-No		
001 51 - 03/LZBA 703 1001/05		
Datum - Date	Rev	Fil - File
1990-08-17	A	MTS01D.5

FIXED TERMINAL SECTIONS:

Section	Document number	Rev
Section 11:		
X.25 interface, fixed terminal	1056 - A 296 5491 Ue	C
HDLC interface, fixed terminal	6/1056 - A 296 5171 Ue	E
BSC interface, fixed terminal	1056 - A 296 5490 Ue	C
MASC interface, fixed terminal	1056 - A 296 5516 Ue	D
Asynchronous terminals, MPAD	1056 - A 296 5454 Ue	C
Section 12:		
Other requirements, fixed terminal	1056 - A 296 5176 Ue	C

MOBILE TERMINAL SECTIONS:

Section	Document number	Rev
Section 15:		
Addendum : Battery-saving protocol for portable terminals	1056 - A 296 6084 Ue	A
Section 16:		
Link layer, mobile terminal	9/1056 - A 296 5171/02 Ue	A
Appendix A, Frames	91/1056 - A 296 5171/A2 Ue	A
Section 17:		
Physical layer, mobile terminals	10/1056 - A 296 5171/02 Ue	A
Section 18:		
Radio equipment, mobile terminals	1056 - A 296 5173/04 Ue	A
Appendix A, Measurement methods	A/1056 - A 296 5173/01 Ue	C
Section 19:		
Other interfaces, mobile and fixed terminals	1056 - A 296 5175/3 Ue	A
Appendix A, Commands	2/1056 - A 296 5175/2 Ue	A
Appendix B, Application example	1/1056 - A 296 5175 Ue	B
Section 20:		
General requirements, mobile terminals	1056 - A 296 5177/02 Ue	A

Endkort

Dokumentnamn	Blad Sheet
LIST OF DOCUMENTS	1(2)

Upprätt - Prepared	Fastställd av - Subject responsible	Nr - No
ET/SYS MÖt	ET/SYS MÖt	001 51 - 03/LZBA 703 1001/06 Ue
Dokansv/Godkänd - Doc responsible/approved	Datum - Date / Rev	Fil - File
ET/SYSC STT	1990-08-17 A	MTS01D.6

Beskrivning	Title
	MOBITEX TERMINAL SPECIFICATION Fixed and mobile terminal with addendum for portable terminal

This set of documents, entitled "MOBITEX TERMINAL SPECIFICATION" applies to:

MOBITEX system:	Ram Mobile Data Inc, USA Fixed and mobile terminal with addendum for portable terminal
Terminal type:	4 900 MHz/8 kbps
Binder identification:	LZBA 703 1001/06, R1A

COMMON SECTIONS:

Section	Document number	Rev
Caption List	001 53 - 03/LZBA 703 1001 Ue	A
Section 1:		
Arrangement of documents	1551 - LZBA 703 1001 Ue	E
List of documents	This document	
Section 2:		
System description MOBITEX	1551 - A 296 5073 Ue	J
Section 3:		
General description terminals	1056 - A 296 5170 Ue	B
Section 4:		
Terminology	0033 - LZBA 703 1001 Ue	E
Section 5:		
References	0015 - LZBA 703 1001 Ue	E
Section 6:		
Network operator documents		
Section 8:		
Application layers	2/1056 - A 296 5171 Ue	G
Section 9:		
Network layer	5/1056 - A 296 5171/2 Ue	A
Appendix A, Packet formats	51/1056 - A 296 5171/2 Ue	A
Appendix B, Dialogues	52/1056 - A 296 5171/2 Ue	A
Appendix C, Logical description	53/1056 - A 296 5171/2 Ue	A

Bodkort

Dok.-Nr.		
001 51 - 03/LZBA 703 1001/06		
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FIXED TERMINAL SECTIONS:

Section	Document number	Rev
Section 11:		
X.25 interface, fixed terminal	1056 - A 296 5491 Ue	C
HDLC interface, fixed terminal	6/1056 - A 296 5171 Ue	E
BSC interface, fixed terminal	1056 - A 296 5490 Ue	C
MASC interface, fixed terminal	1056 - A 296 5516 Ue	D
Asynchronous terminals, MPAD	1056 - A 296 5454 Ue	C
Section 12:		
Other requirements, fixed terminal	1056 - A 296 5176 Ue	C

MOBILE TERMINAL SECTIONS:

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Section 15:		
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Section 16:		
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Appendix A, Frames	91/1056 - A 296 5171/A2 Ue	A
Section 17:		
Physical layer, mobile terminals	10/1056 - A 296 5171/02 Ue	A
Section 18:		
Radio equipment, mobile terminals	1056 - A 296 5173/04 Ue	A
Appendix A, Measurement methods	A/1056 - A 296 5173/01 Ue	C
Section 19:		
Other interfaces, mobile and fixed terminals	1056 - A 296 5175/3 Ue	A
Appendix A, Commands	2/1056 - A 296 5175/2 Ue	A
Appendix B, Application example	1/1056 - A 296 5175 Ue	B
Section 20:		
General requirements, mobile terminals	1056 - A 296 5177/02 Ue	A

Beilagen

Ericsson Programme: ET/SYS IK	Prepared by (Ericsson signature): ET/SYS GC	No: 1055 - A 296 6084 Ue
Dept., Division, Ericsson signature: ET/SYSC STT		Date: 1990-08-13 Rev: A File: MTS15_1
Reference:		Title: ADDENDUM BATTERY-SAVING PROTOCOL FOR PORTABLE TERMINALS

ABSTRACT

This document specifies additional requirements for portable terminals to be connected to the MOBITEX system. It should be considered as an ADDENDUM to the MOBITEX Terminal Specification (MTS) for 8 kbps mobile terminals, LZBA 703 1001, R1A.

A battery-saving protocol is introduced on the data link layer, as well as a new MPAK on the network layer. Both requirements and recommendations for the application layer are presented. Finally, a new command for type approval is included in the MASC interface.

Some of the parameters and protocol procedures mentioned in this document are described incompletely. A full description of them is only presented in the MTS.

Exhibit 3, p. 8

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Dato 1990-08-13 Rev A
Fil MTS15_1

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1 INTRODUCTION

This document specifies additional requirements for portable terminals to be connected to the MOBITEX system.

It should be considered as an ADDENDUM to the complete MOBITEX Terminal Specification for 8 kbps mobile terminals, LZBA 703 1001, R1A.

This is the only document where requirements for portables are stated. They are either additional requirements or new requirements replacing ones that are made in the specification for ordinary mobile terminals.

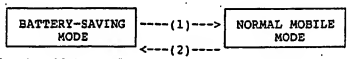
Standard

Ericsson

2 GENERAL DESCRIPTION OF OPERATING PRINCIPLES

A portable terminal is basically a mobile terminal. It conforms to the requirements for ordinary mobile terminals, but with the additional ability to use a battery-saving protocol in the data link layer.

A portable terminal using the battery-saving protocol described in this document is said to be in the battery-saving mode of operation. If it follows the protocol used by ordinary mobile terminals it is said to be in the normal mobile mode of operation.



The reasons for a change of mode might be:

(1) - external power source connected
- operator command (e.g. in case of a major data transaction)
- no <SVP6> received, only <SVP1> ("fall-back" situation)

(2) - external power source disconnected

The battery-saving protocol includes a standby state for the terminal, during which no messages are transmitted or received, and an operating state.

Whenever the terminal wants to transmit a message it enters the operating state, awaits a <FRI>-frame and transmits in a slot that is chosen at random. The terminal then stays in the operating state for some time to be able to receive a quick message response.

Current down-link traffic to portable terminals is indicated by the TRAFFIC LIST of the <SVP6>-frame. Traffic stored in the network mailbox is indicated by the MAIL LIST of the <SVP5>-frame.

The roaming procedure of the portable terminal is essentially the same as for ordinary mobiles, but is controlled by a separate set of parameters in the <SVP3>-frame.

To order (a part of) the fleet of portable terminals to a certain channel the frame <SVP4> is used.

3 DATA LINK LAYER

3.1 PRINCIPLES OF THE BATTERY-SAVING PROTOCOL

3.1.1 States

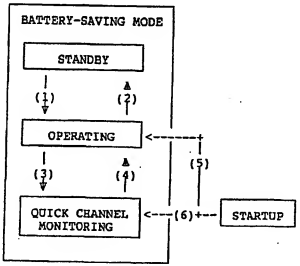
A portable terminal uses three different states of operation in the battery-saving mode:

- standby
- operating
- quick channel monitoring (roaming)

In the standby state only time keeping functions for synchronizing the terminal to the base station are working.

In the operating state messages are transmitted and received, and the roaming values of base stations are evaluated.

In the quick channel monitoring a list of channels is scanned until a new base is found.



where:

(1) and (2) are described together with <SVP6> and in the chapter "MESSAGE TRANSACTIONS"

(3) - (6) are described in the chapter "Roaming and roaming parameters"

3.1.2 Roaming and roaming parameters, <SVP3>

The roaming procedure for portable terminals basically follows the roaming procedure for mobile terminals. Please refer to reference R1-16 for further information.

When the terminal is switched on, it uses the stored values of CURRENT_BASE and CURRENT_SYSTEM_CHANNEL. If there is no CURRENT_BASE stored, the terminal directly starts the quick channel monitoring using the default list of system channels.

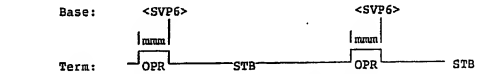
When a suitable base station has been found and the MPAK ROAM/ACTIVE has been sent to it, the portable terminal synchronizes to the <SVP6>-frames.

The normal channel monitoring of the roaming procedure is carried out during the time when the terminal is in the operating state. The terminal measures the averaged received signal strength and calculates a roaming value.

The system parameters controlling the roaming procedure for portable terminals are defined in the <SVP3>-frame. This makes it possible to use different parameters for mobile terminals (defined in the <SVP1>-frame) and for portable terminals.

If the parameter SCAN_TIME is set to 0, the terminal only monitors the CURRENT_SYSTEM_CHANNEL during the operating state.

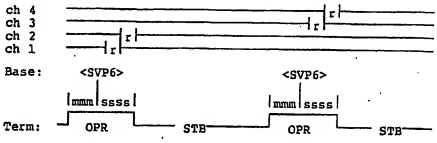
Example 1: SCAN_TIME is set to 0. Only <SVP6>-frames are shown in this figure.



mmm = monitor CURRENT_SYSTEM_CHANNEL
OPR = terminal in operating state
STB = terminal in standby state

If SCAN_TIME is in the range 1 to 255, the terminal monitors other channels according to the channel list information from <SVP3> or from the permanently stored default list. However, the terminal must not leave the CURRENT_SYSTEM_CHANNEL to monitor other channels during the sweep cycle if it is addressed in the TRAFFIC LIST.

Example 2 : SCAN_TIME is in the range 1 to 255.



m = monitor CURRENT_SYSTEM_CHANNEL
s = scan other system channels
r = RSSI_PERIOD
OPR = terminal in operating state
STB = terminal in standby state

Criteria for leaving CURRENT BASE

The same criteria for leaving the CURRENT_BASE applies for a portable terminal as for the mobile terminal but with parameters from the <SVP3> frame. The fifth criterion (item number 5) is replaced by the following rule:

If the terminal has not succeded to synchronize within another 60 seconds, it should start the quick channel monitoring (roaming).

Evaluation of other base stations

The integration time for evaluating base stations on the CURRENT_SYSTEM_CHANNEL is indicated in <SVP6> (default value 60 seconds).

The integration time for evaluating base stations on other channels is also indicated in <SVP6> (default value 3 RSSI periods).

Quick channel monitoring

During the quick channel monitoring when the parameter SCAN_TIME is set to 0 and when the terminal has found a base with roaming value higher than GOOD_BASE, the terminal should remain on that channel for at least 5 seconds during the measuring of received signal strength. Please refer to item number 4 in the description of quick channel monitoring in the ROAMING chapter, reference R1-16.

3.1.3 Fleet division, <SVP4>

To order the fleet of portable terminals (or parts of it) to a certain system/access channel the <SVP>-frame of subtype 4 is used: <SVP4>. It is interpreted in same way as the <SVP2>-frame for mobile terminals, described in reference R1-16.

3.1.4 Mail list, <SVP5>

Messages not acknowledged by the terminal may be stored in the network mailbox according to the conditions described in R1-09 .

In order to inform terminals that have messages in the network mailbox, the MAIL LIST is used.

The MAIL LIST is included in the <SVP>-frame of subtype 5: <SVP5>.

3.1.5 Traffic list, <SVP6>

The TRAFFIC LIST contains the terminal/group-MAN of those terminals that must remain in the operating state in order to receive down-link traffic from the network.

This list is included in the <SVP>-frame of subtype 6: <SVP6>.

Terminals not included in the TRAFFIC LIST may return directly to the standby state.

3.1.6 Synchronization to the network, <SVP6>

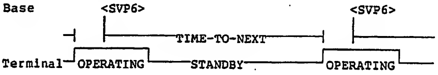
The network periodically transmits <SVP6>-frames on system channels where the battery-saving protocol is used.

Terminals using this protocol cyclically shifts between the standby state and the operating state. This shifting is synchronized by the <SVP6>-frames.

The <SVP6> contains the parameter TIME-TO-NEXT. The value of this parameter defines the next time the terminal should enter the operating state.

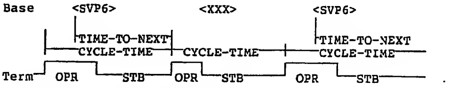
Once it has entered the operating state the terminal remains there, until it receives an <SVP6>-frame containing a TRAFFIC LIST in which it is not included.

<u>Example 1:</u> The terminal uses TIME-TO-NEXT for synchronization.



The <SVP6> also contains the parameter CYCLE-TIME. The value of this parameter defines the time between the start of one operating state and the start of the next one. If one or more of the <SVP6> frames are lost, the terminal should use the CYCLE-TIME parameter in order not to lose synchronization.

<u>Example 2:</u> The terminal is using CYCLE-TIME in order to maintain synchronization when a <SVP6> has been lost.



OPR = operating state
STB = standby state
<XXX> = lost frame

If the network is going to send other <SVP>-frames, when the terminals are in the operating state, they will be sent prior the <SVP6> frame. The <SVP6> ends the sequence of <SVP>-frames.

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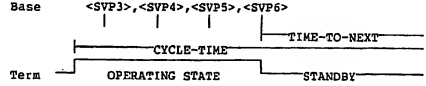
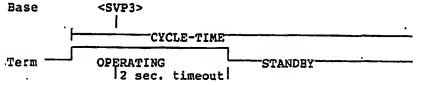
Example 3: Multiple sweep frames are received during the operating state.



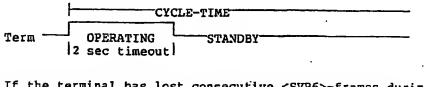
After the reception of every <SVP3> to <SVP5> the terminal stays in operating state for another 2 seconds or until it receives an <SVP6>.

Example 4: The terminal receives a <SVP3> but the <SVP6> is not received. The operating state is terminated by the 2 second timeout. The timeout is counted from the reception of the <SVP3> frame.



If none of the <SVP3> to <SVP6> has been received within 2 seconds from the transition to the operating state, the terminal may return to standby.

Example 5: No <SVP>-frames are received within 2 seconds from the start of the operating state.



If the terminal has lost consecutive <SVP6>-frames during 60 seconds, it should stay in the operating state to synchronize again.

If the terminal has not succeded to synchronize within another 60 seconds, it should start the quick channel monitoring (roaming).

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3.2 MESSAGE TRANSACTIONS

3.2.1 Up-link traffic

The access requirements for up-link traffic from portable terminals are basically the same as those for mobile terminals.

A portable terminal that is going to transmit a message to the network enters the operating state. It awaits a valid <FRI>-frame from the network and then chooses a random slot for its transmission.

When <ABD> is used to request access for transmission, the terminal must remain in the operating state until the message is transferred successfully or the dialogue is otherwise terminated.

After a message is successfully transferred to the network the terminal remains in the operating state during a specified period of time before it returns to the standby state. This period is defined by the parameter TRANSACTION-TIME in <SVP6> and makes it possible to transmit a quick reply message to the terminal without waiting for the next transmission of a TRAFFIC LIST. During the period a logical down-link channel might be said to exist between the terminal and its base station.

3.2.2 Down-link traffic

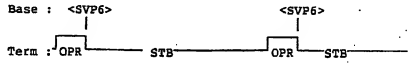
Down-link traffic to terminals is indicated by the TRAFFIC LIST. When a terminal receives a list containing one of its addresses (terminal or group MAN) it remains in the operating state.

When a message is successfully received, the terminal remains in the operating state during the period of time defined by the parameter TRANSACTION-TIME (included in <SVP6>). If this period expires without any further messages, the terminal returns to the standby state.

When <BKD> is used to order the terminal to another channel for a down-link transmission, the terminal must remain in the operating state until the message is received successfully or the dialogue is otherwise terminated.

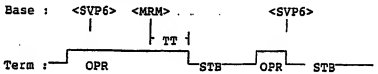
A terminal may also leave the operating state when it receives a TRAFFIC LIST in which it is not addressed.

Example 1: The terminal is not addressed in the TRAFFIC LIST.



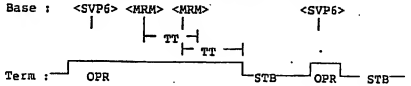
OPR = terminal in operating state
STB = terminal in standby state

Example 2: The terminal is addressed in the TRAFFIC LIST of <SVP6> and the network has one <MRM> to transmit.



TT = TRANSACTION-TIME
OPR = terminal in operating state
STB = terminal in standby state

Example 3: The terminal is addressed in the TRAFFIC LIST of <SVP6> and the network transmits multiple <MRM>:s during the sweep cycle.



TT = TRANSACTION-TIME
OPR = terminal in operating state
STB = terminal in standby state

3.2.3 Line connections

Call set-up and disconnection procedures for line connection to a portable terminal follow the requirements of the MTS.

When a portable terminal is called from the network for a line connection, the terminal is addressed in the TRAFFIC LIST. The terminal remains in the operating state and follows the normal procedure for call set-up described in the MTS.

When the call has been disconnected, the terminal uses the stored values of CURRENT_BASE and CURRENT_SYSTEM_CHANNEL to re-synchronize to the <SVP6>-frames. The terminal returns to the standby state when it has received a <SVP6>-frame where it is not included in the TRAFFIC LIST.

When a portable terminal initiates a call set-up for a line connection, the terminal enters operating state before sending the line connection request, and stays in this state until the call is disconnected, according to the MTS.

3.3 FORMAT DEFINITION OF <SVP>-FRAMES

FRAME TYPE <SVP>, Sweep signal

APPLICATION The sweep signal is a periodically recurring signal from BASE. An <SVP> is transmitted by BASE for two reasons:

1) <SVP> marks the start of a sweep cycle.

2) <SVP> contains system parameters.

<SVP> has 2 different subtypes for mobile terminals and 4 subtypes for portable terminals :

SUBTYPE 1 states the values of system parameters for mobile terminals

2 states the frequency of different channel types for mobile terminals.

3 only relevant for portable terminals using the battery-saving protocol described in this document. This subtype contains the system parameters.

4 states the frequency of different channel types for portable terminals.

5 includes the MAIL LIST for portable terminals (may be used both in the battery saving mode and in the normal mobile mode)

6 includes the TRAFFIC LIST and the timing parameters for portable terminals.

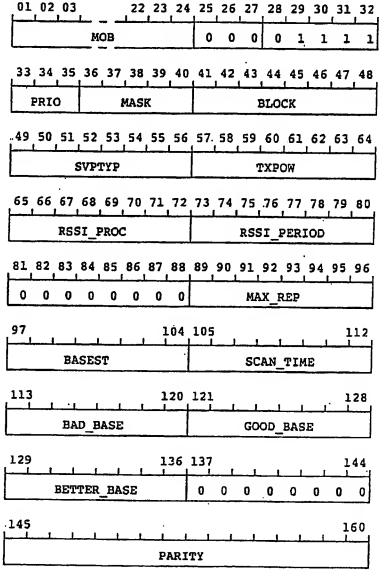
Note 1: <SVP> of subtype 1 and 2 are not described in this Addendum. Please refer to R1-16.

Note 2: For <SVP5> and <SVP6>, the terminal should use all correctly received following blocks, even though the whole frame may not be correct. This procedure decreases the possibility of the terminal missing a list where it is addressed.

3.3.1 <SVP3>

<SVP>, SUBTYPE 3 - states the values of system parameters for portable terminals.

PRIMARY BLOCK



SVPTYP	States the <SVP> subtype, value 00000011 in this case.
TXPOW	States the decrease in output power (0-255 dB below nominal level) to be used by the portable terminal. A default value of 0 is used at start-up until this signal is received.
RSSI_PROC	States the method of the signal strength measurement: 0 = FRAME 1 = CONTINUOUS The default value is FRAME.
RSSI_PERIOD	Time used by the roaming algorithm (0-255 *20 ms). Default value: 148 (2 960 ms).
MAX_REP	States the value of the variable Max_rep.
BASEST	States status of base station.
SCAN_TIME	States the length of a period (0-255 *100 ms) when the portable terminal scans other system channels. Default value: 30 (3 seconds).
BAD_BASE	Used by the roaming algorithm. 0-255 dBuV. Default value: 15.
GOOD_BASE	Used by the roaming algorithm. 0-255 dBuV. Default value: 15.
BETTER_BASE	Used by the roaming algorithm. 0-255 dB. Default value: 10.

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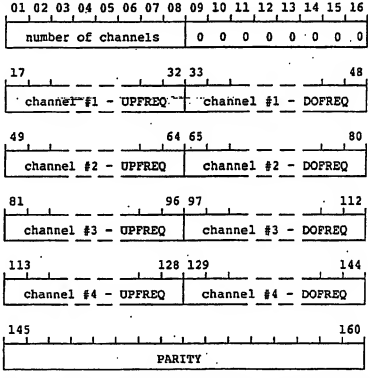
FOLLOWING BLOCKS

If any, they contain a list of system channels to be used in base station monitoring. A frame with a list containing new system channels completely overrides the previous frame. The channel list has the following format (as described in the MAIN DOCUMENT):

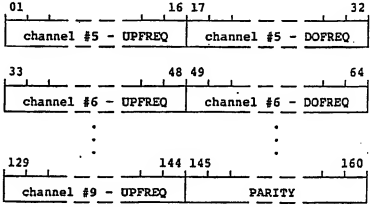
FOLLOWING BLOCK #1



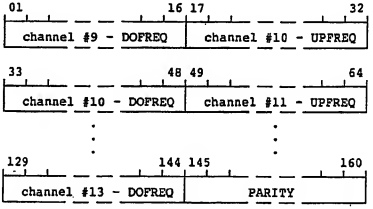
The number of following blocks depends on the size of the list. The maximum number of channels in the list is stated in reference R1-06.

Continues with following block #2 on the next page.

FOLLOWING BLOCK #2



FOLLOWING BLOCK #3

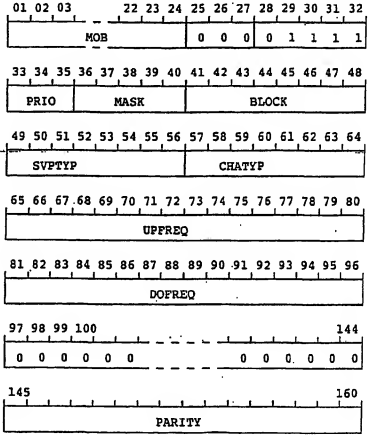


additional FOLLOWING BLOCKS may follow if required.

3.3.2 <SVP4>

<SVP>, SUBTYPE 4 - states the frequency of different channel types for portable terminals.

PRIMARY BLOCK



SVPTYP — States the <SVP> subtype, value 00000100 in this case.

CHTYP — States the type of channel:

Value:	
1	Local system channel opened
2	Not used (ignore that order)
3	Local system channel closed (return to previous system channel)
4	Access channel opened
5	Access channel closed

UPFREQ — Frequency number for up frequency, i.e. the frequency on which the terminal transmits.

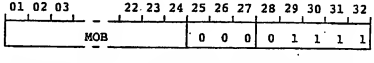
DOFREQ — Frequency number for down frequency, i.e. the frequency on which BASE transmits.

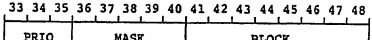
FOLLOWING BLOCK — No following blocks in this type of frame.

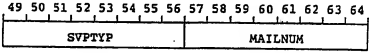
3.3.3 <SVP5>

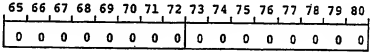
<SVP>, SUBTYPE 5 - contains a list of terminal MAN having messages stored in the network mailbox.

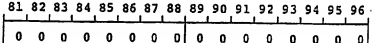
PRIMARY BLOCK

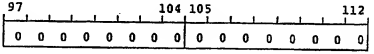


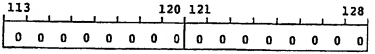


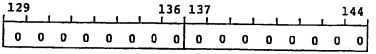


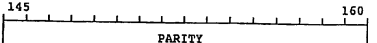












SVPTYP — States the <SVP> subtype, value 00000101 in this case.

MAILNUM — Number of MAN:s in list (0-186).

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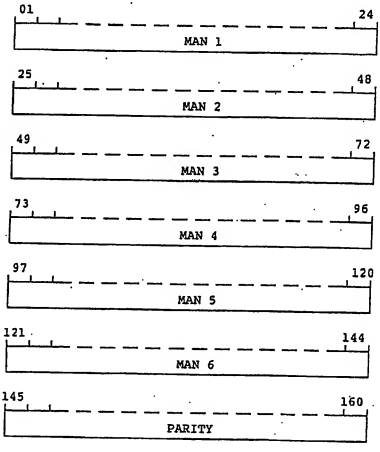
FOLLOWING BLOCKS

Containing a list of terminal MAN having messages stored in the network mailbox.

FOLLOWING BLOCK #1



The number of following blocks depends on the size of the list (maximum 186 MAN).

Continues with following block #2 on the next page.

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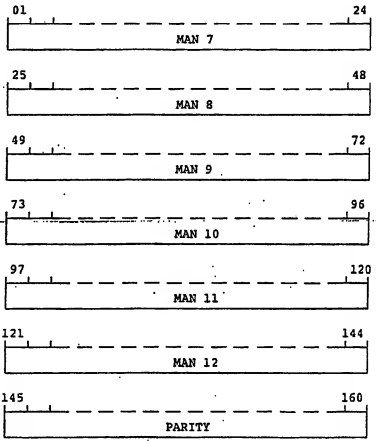
FOLLOWING BLOCK #2



additional FOLLOWING BLOCKS may follow if required.

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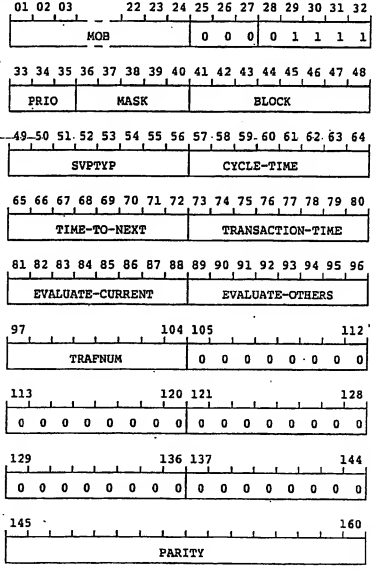
3.3.4 <SVP6>

<SVP>, SUBTYPE 6 - contains the timing parameters used in synchronization and message transactions.

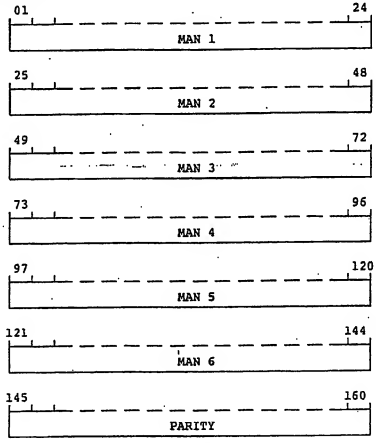
PRIMARY BLOCK



SVPTYP	States the <SVP> subtype, value 00000110 in this case.
CYCLE-TIME	States the time (0-255 *250 ms) between the start of one operating state and the start of the next one.
TIME-TO-NEXT	States the time (0-255 *250 ms) from bit 1 in the frame head of the received <SVP6> to the next time the terminal should enter the operating state.
TRANSACTION-TIME	States the time (0-255 *250 ms) the terminal should stay in the operating state after receiving or transmitting <ACK>, respectively. Default value: 40 (10 seconds)
EVALUATE-CURRENT	Integration time (0-255 seconds) for evaluating base stations on the CURRENT_SYSTEM_CHANNEL. Default value: 60 seconds.
EVALUATE-OTHERS	Integration time (0-255 RSSI periods) for evaluating base stations on other channels. Default value: 3 RSSI periods.
TRAFNUM	Number of MAN:s in list (0-186).

FOLLOWING BLOCKS — Containing a list of terminal MAN or group MAN with pending down-link traffic.

FOLLOWING BLOCK #1



The number of following blocks depends on the size of the list (maximum 186 MAN).

Continues with following block #2 on the next page.

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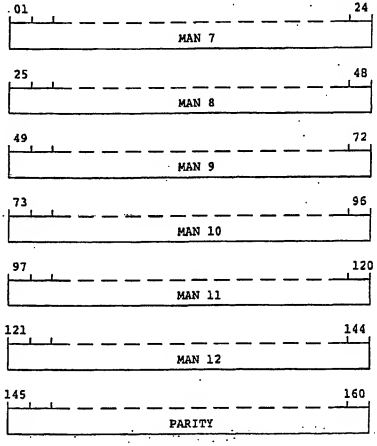
FOLLOWING BLOCK #2



additional FOLLOWING BLOCKS may follow if required.

4 NETWORK LAYER

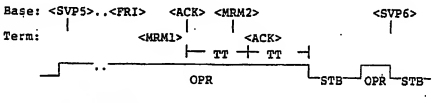
4.1 ACTIVATION/INACTIVATION

Portable terminals used in-doors are likely to lose contact with the network much more frequently than mobile terminals. They should therefore not send ACTIVE due to 'lost contact' according to the roaming procedure since this will cause considerable system signalling overhead.

Portable terminals send INACTIVE / ACTIVE when switched-off and switched-on respectively.

When a portable terminal is addressed in the MAIL LIST it has the possibility to empty the mailbox by sending an ACTIVE packet.

Example 1: The terminal is addressed in the MAIL LIST of <SVP5> and the network has one or more <MRM> placed in the mailbox.



TT = TRANSACTION-TIME
OPR = terminal in operating state
STB = terminal in standby state
MRM1 = MPAK ACTIVE
MRM2 = any MPAK from mailbox

4.2 NEW PARAMETERS IN MPAK INFO (terminal information)

The parameter terminal type information (TTI) is used by the network to separate terminals with different functionality.

Terminals with the battery-saving protocol according to this document have:

TTI = 4, terminal type 4. (octet 6)

The parameter MODE (octet 12) identifies the operating mode of the terminal:

0 = NORMAL MOBILE MODE

1 = BATTERY-SAVING MODE

2-255 = reserved

4.3 ADDITIONAL MPAK - MODE (mode information)

A new MPAK is included for terminals using the battery-saving protocol. This MPAK is used to inform the network that the terminal has changed from battery saving mode to normal mobile mode and vice versa.

The portable terminal always has the possibility to change to normal mobile mode, e.g. for a major data transaction. In order to inform the network of this change of mode, the terminal sends the new MPAK called MODE. This MPAK is within the packet class DTESERV (3) and has the packet type 24.

MODE (mode information):

Designated sender:

The portable terminal.

Designated addressee:

The network.

Raised flags:

No raised flags.

Criteria for generating the packet:

When a portable terminal changes from the battery-saving mode to the normal mobile mode this packet is used to inform the network.

The same packet is sent to the network, but with a different mode identifier, when the terminal changes to the battery-saving mode.

The network's normal action when receiving the packet:

The network registers the operating mode of the terminal. If the terminal is using the battery-saving protocol, the terminal is addressed in the TRAFFIC LIST when traffic is pending.

If the terminal is operating as a mobile terminal the network sends traffic immediately to the terminal.

The terminal's normal action when receiving the packet:

The terminal does not normally receives this packet.

Length of the packet:
9 octets.

MODE as generated by the terminal:

MPAK-COMMON COMPONENT:

octet 1-3:	sender: the terminal
octet 4-6:	addressee : the Mobitex Network
octet 7:	0 0 0 0 0 0 0 0
octet 8:	1 1 0 1 1 0 0 0

TYPE DEPENDENT COMPONENT:

octet 9 :	mode identifier

mode identifier :

0 = NORMAL MOBILE MODE

1 = BATTERY-SAVING MODE

2-255 = reserved

5 APPLICATION LAYER

5.1 REQUIREMENTS

5.1.1 'Fall-back' to normal mobile operating mode

If the terminal cannot find any signalling required for the operation of the battery-saving protocol (<SVP6>), but detects <SVP1> required for mobile terminal operation, the terminal may act as mobile terminal. The user should be informed of this.

The MPAK MODE is sent to the network, informing that the terminal has changed to the normal mobile mode.

5.1.2 User notification of 'lost contact'

When the terminal loses contact with the network and starts the quick channel monitoring, the operator of the terminal should be notified.

5.1.3 RSSI when transmitting

It is recommended to display the received signal strength to the user, especially when the terminal is going to transmit, so the user can move the terminal to a suitable location.

5.2 RECOMMENDATIONS

5.2.1 Manual selection of operating mode

It is recommended that the terminal enters the normal mobile mode of operation, when it is mounted into a battery charger, e.g. in a car.

The user or the terminal itself initiates the transmission of the MPAK MODE to the network. This message will then identify the operating mode of the terminal.

5.2.2 Prevention from automatic quick channel monitoring

The user should be allowed to manually switch off the quick channel monitoring function in order to prevent this automatic function from continuously running, or to prevent the terminal from repeated attempts to enter the quick channel monitoring.

It is also recommended that the terminal has some kind of watchdog function implemented, limiting the operating time in quick channel monitoring mode.

5.2.3 Manual initiation of quick channel monitoring

If the portable terminal is implemented without automatic quick channel monitoring functions it is recommended that this function can be manually started.

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6 MASC INTERFACE

For type approval the terminal must contain a 'MASC' interface. The same requirements apply as for the mobile terminal concerning the 'MASC' interface, which means that the PA- and KA-commands should be included during type testing.

An additional type test command, PA07, has been added for terminals operating according the battery-saving protocol.

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6.1 PA-command
(request/list of battery-saving protocol parameters)

The PA07-command is used by the type test terminal to request battery-saving protocol parameters and by the portable terminal to send these parameters as a reply to the request.

The structure of the text field in a request for parameters from the type test terminal to the portable terminal :

PA07

4 bytes

The structure of the text field in a reply from the portable terminal to the type test terminal (list of parameters):

PA07	SP	list of parameters
4	1	>=4 bytes

The data field is empty.

The list of parameters consists of a number of ASCII coded hex numbers separated by , (comma). If a parameter is not available in the terminal, this parameter is not included in the reply. The parameters are sent in the following order:

Parameter	No of bytes
Cycle_time	1
Time_to_next	1
Transaction_time	1
Evaluate_current	1
Evaluate_others	1

The meaning and the structure of the different parameters can be found in the chapter 'FORMAT DEFINITION OF <SVP>-FRAMES' of this document.

Example of PA07-command:

```
MCU                          TERMINAL
                  <--------  PA07
PA07 01,02,03,04,05 ------>

or

PA07 ,,,,           ------>
```

7 MOBITEX TERMINAL SPECIFICATION REFERENCE LIST

This document includes a number of references, made to other sections in the terminal specification. The list below shows these references, together with the page(s) they are made on. Please note that a section could be referred to several times on the same page.

R1-06, 17
R1-09, 8
R1-16, 6, 7, 8, 14

Below are the reference designations listed.

Reference	Section
R1-01	Arrangement of the documents
R1-02	MOBITEX System description
R1-03	General description of terminals
R1-04	Terminology
R1-05	References
R1-06	Network operator information
R1-08	Application layer
R1-09	Network layer
R1-11	Interface requirements, fixed terminals
R1-12	Other requirements, fixed terminals
R1-16	Link layer, mobile terminals
R1-17	Physical layer, mobile terminals
R1-18	Radio equipment, mobile terminals
R1-19	Other interfaces, mobile terminals
R1-20	Other requirements, mobile terminals